

3. A Study of the Pteroclidæ or Family of the Sand-Grouse.  
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[Received January 18, 1878.]

The materials for the present paper were supplied by the splendid collection in the Paris Museum, kindly placed at my disposal by Prof. A. Milne-Edwards, who afforded me every facility for investigating this interesting group of birds, and to whom, as well as to Dr. E. Oustalet, Aide-Naturaliste, I desire to express my thanks. With the exception of *P. decoratus*, the type of which is, I believe, unique, every known species of the Pteroclidæ is represented in that Museum, many of them by series of both sexes in different plumages; and certain specimens are the types of the older writers. In the treatment of my subject I have followed the same method as that adopted for my "Review of the Ibidinæ"<sup>1</sup>, and give first the Literature of the Family, then the Classification, followed by some remarks upon the different genera proposed for the group; these are succeeded by a review of the Geographical Distribution; and I conclude with the synonymy and description of each species.

LITERATURE OF THE FAMILY.

Linnaeus is the first author to claim our attention.

1766. LINNÆUS, 'Systema Naturæ.'

In the list of species comprised in the genus *Tetrao*, this author places among those characterized by "*pedibus nudis*" a single species belonging to the Pteroclidæ, called by him *Tetrao alchata*. Species 1.

1771. LINNÆUS, 'Mantissa.'

In this work the *P. senegalus* is described as *Tetrao senegalus*. Species 2.

1773. PALLAS, 'Reise durch Verschied. Provinz. Russisch. Reichs.'  
*Syrnhaptes paradoxus* is described as *Tetrao paradoxus*. Species 3.

1774. PALLAS, 'Nov. Comm. Petropol.'

*Pterocles arenarius* first made known as *Tetrao arenarius*. Species 4.

1786. SCOPOLI, 'Deliciæ Faunæ et Floræ Insubricæ.'

*Pterocles fasciatus* first described as *Tringa fasciatus*. Species 5.

1788. GMELIN, 'Systema Naturæ.'

Five species of this family are given by this author, all placed in Linnaeus's genus *Tetrao*, viz. *T. alchata*, Linn., *T. namaqua*, described for the first time, *T. indicus* (= *T. fasciata*, Scop.), *T. arenarius*, Pall., and *T. paradoxus*, Pall. Species 6.

<sup>1</sup> P. Z. S. 1877, p. 477.

1815. TEMMINCK, 'Histoire Naturelle Générale des Pigeons et Gallinacés.'

A general review of the Pteroclidæ is here given, as known to the author, with some species renamed that were previously described. They are as follows:—*P. arenarius*, Pall., *P. bicinctus*, *P. quadricinctus*, both described for the first time, *P. setarius* (= *T. alchata*, Linn.), *P. tachypetes* (= *T. namaqua*, Gmel.), and *Syrrhaptes pallasii* (= *T. paradoxa*, Pallas). Species 8.

1817. VIEILLOT, 'Nouveau Dictionnaire d'Histoire Naturelle.'

In his genus *Enas* are here included such species of this family as were known to the author, viz. *Æ. cata* (= *T. alchata*, Linn.), *Æ. bicincta*, *Æ. indica* (= *T. fasciata*, Scop.), *Æ. namaqua*, and *Æ. arenaria*. No new species are described.

1822. BURCHELL, 'Travels in South Africa.'

*Pterocles variegatus* first described. Species 9.

1823. LICHTENSTEIN, 'Verzeichniss der Doubletten des zool. Museum zu Berlin.'

*Pterocles coronatus* first described. Species 10.

1825. TEMMINCK, 'Planches Coloriées.'

*Pterocles exustus* and *P. lichtensteini* first described and figured. In an earlier portion of the work, in the 9th livraison (1823), *P. arenarius* is figured ♂ and ♀; and in the 57th livraison (1825) a representation of both sexes of *P. coronatus* is given. Species 12.

1837. SWAINSON, 'Birds of West Africa.'

*Pterocles quadricinctus*, Temm., renamed *P. tricinctus*.

1843. GOULD, in the 'Voyage of the Sulphur, Birds.'

*Pterocles personatus* described. Species 13.

1849. SMITH, 'Illustrations of South-African Zoology.'

*Pterocles gutturalis* described. Species 14.

1850. GOULD, in 'Proceedings of the Zoological Society of London.'

*Syrrhaptes tibetanus* described. Species 15.

1856. BONAPARTE, in 'Comptes Rendus.'

In his Table des Galinacés, Bonaparte proposes the genus *Pteroclurus* for certain species of this family, of which the *T. alchata*, Linn., may be considered as the type.

1870. CABANIS, in 'Von der Decken's Reise.'

*Pterocles decoratus* described. Species 16.

#### CLASSIFICATION.

The natural position of the Pteroclidæ (called by Prof. Huxley Pteroclomorphæ), in the Class Aves, is between the Columbidae (Peristeromorphæ) on the one hand, and the Tetraonine series of the

Gallinaceous birds (Alectoromorphæ) on the other, supplying the link which connects these two great divisions, and with them constitutes the Gallo-Columbine series. The Pteroclidæ resemble the Alectoromorphæ in their skull, palatines, maxillo-palatines, and bill; but the pterygoid and basipterygoid processes, sternum, furcula, coracoid, and fore limb are like those of the Pigeon. The foot, with its almost absent hallux (entirely wanting in *Syrrhaptēs*), and the short tarso-metatarsus are, however, very unlike a Pigeon's. The vocal organs, as shown by Mr. Parker<sup>1</sup>, are the same as a Pigeon's; the trachea is cartilaginous, and possesses a pair of laryngeal muscles at its bifurcation; but the crop, gizzard, gall-bladder, and small intestines are like those of Gallinaceous birds. The cæca coli are very voluminous, but have twelve continuous longitudinal folds in their mucous membrane, instead of seven as in *Lagopus*. The proventricular glands, however, are Pigeon-like. The pterylosis of the Sand-Grouse, although very similar to that of a Pigeon, differs somewhat on its dorsal surface. The lateral neck-spaces are shorter, only reaching to the beginning of the neck; the superior wing-space is absent; the lumbar tracts coalesce with the posterior part of the dorsal tract, which latter also joins the plumage of the tibia. In some species the narrow spinal tract is wanting. The Pteroclidæ also differ from the Pigeons in possessing an after-shaft on the contour feathers, and from the Gallinaceous birds in having a naked oil-gland.

From the above it will be clearly seen how intermediate these singular birds are of the two great groups between which they are placed. In some of their characters they are also pluvialine, and their flight is especially Plover-like; but in their method of drinking they resemble the Pigeons, as the bill is thrust up to the nostrils into the water, and retained there until the bird's thirst is allayed. The members of the two genera adopted for this family closely resemble each other in their outward shape, being generally rather heavy of body, with long pointed wings and extremely short legs and toes, apparently quite disproportionate in size to the rest of the bird. The species, therefore, are awkward when on the ground, run clumsily, and appear to great disadvantage; but on the wing they move rapidly and gracefully. The bill, though small, is strong and Grouse-shaped; in *Pterocles* the tarsi are feathered in front; in *Syrrhaptēs* both tarsi and toes are completely covered with feathers, as in the winter coat of the Ptarmigan. I have arranged the members of *Pterocles* in two divisions, distinguished by the presence or absence of a conspicuous band across the breast. The first of these, without a pectoral band, contains five species, all but one having the breast of a uniform coloration.

The second division, with a pectoral band, possesses nine species, having, as a rule, a very different style of coloration from those in the other section of the genus. In the remaining genus *Syrrhaptēs*, but two species are as yet known, separated in their outward appearance from their relations in *Pterocles* by the feathered leg and foot

<sup>1</sup> Trans. Zool. Soc. vol. v. p. 204.

and the entire absence of a hind toe. One character by which *Syrrhaptes* was formerly distinguished was the extremely lengthened filamentous first primary observed in *S. paradoxus*; but since the discovery of the second species, which does not possess a similar formation, this peculiarity will not answer as a means of generic distinction. Both species of *Syrrhaptes* have the median rectrices much lengthened beyond the rest; but as this also occurs with several species of *Pterocles*, it cannot be regarded as of generic importance.

#### GENERA.

But few generic terms fortunately have been proposed for these birds. Usually placed by the older authors, who were misled by their feathered tarsi, in *Tetrao*, they were first separated from the Grouse by Temminck, who, in 1815<sup>1</sup>, created for them the term *Pterocles*. In 1811 Illiger proposed *Syrrhaptes* for the *Tetrao paradoxa* of Pallas, separating it from the other species of the family. In 1812 Fischer instituted the term *Nematura* for the same bird, followed in 1816 by Vieillot with *Heteraclitus*, and also with *Ænas* for the other members of the family. Lastly Bonaparte, in 1856, created the term *Pteroclorus*. Two generic forms are evidently represented among the Pteroclidæ, for which the terms *Syrrhaptes*, of Illiger, to contain the two species *S. paradoxus* and *S. thibetanus*, and *Pterocles* of Temminck to include all the rest of the family, have the claim of priority, and are amply sufficient for the recognition of the generic divisions now existing. In the osteology of the two genera there are considerable differences observable, as has been well shown by Mr. Parker, some of which are the following:—The skull of *Syrrhaptes* is weaker, less gallinaceous, and more pigeon-like than that of *Pterocles*; the upper frontal region is narrower between the eyes, and the alæ of the ethmoid are less swollen between the crura of the nasal. In *Pterocles* the bones of the face are as strong as is observed in a Pigeon; the lower jaw is stronger than in *Syrrhaptes*, and bends further back; the postorbital and squamosal processes are stronger, as is also the malar arch; in some characters of the skull and skeleton they are nearly alike. *Pterocles* has the scapula more like that of a Grouse, and also possesses one more caudal vertebra than *Syrrhaptes*, and the styliform and sacral ribs have no appendage; but both genera have a rudiment attached to the last hæmapophysis. The sternum is stronger, with the episternum and hyosternal processes as in *Syrrhaptes*; but the external hyposternal processes are shorter.

Of fossil remains of Pteroclidæ but two tarso-metatarsal bones have been found, which have been described by Prof. A. Milne-Edwards, in his great work 'Les Oiseaux Fossiles,' as *Pterocles sepultus*. By the kindness of their possessor I have had an opportunity of examining

<sup>1</sup> In his 'Manuel d'Ornithologie' (1820), 2nd part, p. 474, in a footnote, Temminck states that he published an account of these birds under the generic name of *Pterocles* in 1809. I have not been able to find this publication, nor any record of it, and 1815 is the earliest date I can assign to the genus.



these interesting specimens. There is a slight difference observable in their size, one being rather stouter than the other; and they evidently belong to two individuals, perhaps different sexes of the same species; and, as stated by Monsieur A. Milne-Edwards<sup>1</sup>, represent a species between the *P. alchata*, Linn., and the *P. gutturalis*, Smith.

The following are the genera proposed for these birds, with the type of each added:—

|                                                             | Type.                           |
|-------------------------------------------------------------|---------------------------------|
| (1811) <i>Syrrhaptes</i> , Illiger, Prodr. p. 243 .....     | <i>Tetrao paradoxus</i> , Pall. |
| (1812) <i>Nematura</i> , Fisch. Mém. Soc. Natur. Moscou     | <i>Tetrao paradoxus</i> , Pall. |
| (1815) <i>Pterocles</i> , Temm. Man. Ornith. p. 299.....    | <i>Tetrao alchata</i> , Linn.   |
| (1816) <i>Enas</i> , Vieillot, Analyse, p. 52 .....         | <i>Tetrao alchata</i> , Linn.   |
| (1816) <i>Heteraclitus</i> , Vieillot, Analyse, p. 53 ..... | <i>Tetrao paradoxus</i> , Pall. |
| (1856) <i>Pterochlorus</i> , Bon. Compt. Rend. xlii. p. 880 | <i>Tetrao alchata</i> , Linn.   |

### GEOGRAPHICAL DISTRIBUTION.

The Pteroclidæ have been found in only three of the zoogeographical divisions of the earth's surface, viz. the Palæarctic, Oriental, and Ethiopian regions; and in these they are chiefly restricted to tracts devoid of cultivation, or actual deserts. From the fact that of the sixteen known species twelve are met with in the Ethiopian region, we may safely regard the Pteroclidæ as having originated in Africa, from which they spread into the other two regions named above. Of the twelve Ethiopian species, seven (or a little over half) are not found in the other zoogeographical divisions. In the Oriental region, which is the next richest in the birds of this family, seven species are found, one of which is peculiar to it; and, lastly, the Palæarctic region is tenanted by five species, two of which, constituting the genus *Syrrhaptes*, are not found elsewhere. Commencing with the Ethiopian region, where the species appear confined mainly to the eastern side of the continent, we find the *Pt. gutturalis* extending its range from Abyssinia to Kurrichane, just north of the Cape Colony, where it was procured by Sir A. Smith. In Egypt and Nubia *Pt. coronatus* is found, not going south of the last-named country on this coast. It is also met with in the southern part of the desert of Sahara, and again on the plains of the Sinaitic peninsula, and probably occurs throughout Arabia, as, together with the three species next mentioned, it is found in Sindh of the Oriental region. In the region extending from and including Egypt to the Somali country *Pt. exustus*, *Pt. senegalus*, and *Pt. lichtensteini* are found; while *Pt. quadricinctus* appears to be restricted to Abyssinia and Sennaar, although given by Swainson as a bird of West Africa under the name of *Pt. tricinatus*. Passing southwards along the same coast, we find *Pt. variegatus*, *Pt. namaqua*, and *Pt. bicinctus* inhabiting the Trans-Vaal, whence they range across this part of the continent into Damaraland. Somewhere in the interior of Eastern Africa *Pt. decoratus* dwells, according to Cabanis; but its precise distribution does not appear

<sup>1</sup> Oiseaux Fossiles, tom. ii. p. 295, pl. 141. figs. 1-9.

to be exactly known. The type and only known specimen was obtained near Lake Jipe. It is most probable that the range of some of the species mentioned above may be much greater; but before this can be definitely determined our knowledge of the interior of the continent and its avi-fauna must be greatly increased. *Pt. exustus* is given by Hartlaub, in his 'System der Ornith. West-Afrika's,' upon the authority of a specimen in the Berlin Museum, as an inhabitant of Senegal. I have not seen this corroborated by any other writer; and the species seems to be more particularly a bird of East Africa, although it is not unlikely that it may skirt the southern border of the Sahara quite across the continent. Finally, according to Tristram, *Pt. arenarius* is found everywhere in the Sahara, except in the extreme south. In the Oriental region, the next in order, we find that in Sindh, with the exception of *Pt. decoratus* and *Pt. quadricinctus*, all of those species already mentioned as dwelling in the Ethiopian region are met with, two of which (*Pt. coronatus* and *Pt. lichtensteini*) do not seem to be found in any other part of India. *Pt. senegalus* is met with along the shores of the Runn of Cutch and in Northern Guzerat; while *Pt. arenarius* goes north into the Punjaub and thence through the North-west Provinces; and *Pt. alchata* occurs in the Peshawur valley. *Pt. exustus* and *Pt. fasciatus* are distributed generally throughout India, the last-named species not being found in Sindh.

The last zoogeographical region in which these birds occur is the Palæarctic; and commencing in the far east we have the members of the genus *Syrnhaptis*; of which *S. paradoxus* ranges from the plains of Pekin and Tientsin, through Mongolia and the Great Gobi desert into the Kirghis steppes, occasionally wandering into parts of Western Europe in more or less extensive numbers. The year 1863 was a notable one for a great migration of this species, flocks of considerable size having been observed as far west as Ireland. The only other known species, *S. tibetanus*, is distributed from the Kokonor basin on the east, through Northern Thibet to Ladakh. In this region also, *Pt. senegalus* is a native of Palestine, where, according to Tristram, it is numerous. *Pt. arenarius* is common throughout Turkestan, and is not rare in the eastern steppes of New Russia and the Caucasus. It is also met with in Persia and about Erzerum, not uncommon in Palestine, and is distributed generally throughout south-western Europe, being common in Spain and Portugal. It is also a dweller of the Algerian deserts, whence it extends into the Ethiopian region as already enumerated, and has also been obtained in Greece. Its most western locality that I have seen recorded is the Canary Islands, where it has been observed in the Grau Canaria. The only remaining species to be noticed in the Palæarctic region is *Pt. alchata*, which ranges from the Kirghis steppes into southern Russia; it is common in Asia Minor and Palestine, and occurring throughout Southern Europe, is found in France where *Pt. arenarius* is not known. It is also common in Spain, and frequently met with in Portugal, and is abundant in the Algerian deserts. It has been

obtained at Malta, and also in Greece, where, according to Von der Mühle, a specimen has been procured in Eubœa.

### Genus PTEROCLES.

Body rather long and heavy; bill rather stout; culmen curved; groups ascending; sides of mandibles compressed. Nostrils basal, open, oblong, partly covered by a membrane; frontal feathers projecting over, but not intruding upon, the nasal aperture. Wings long, pointed; first primary longest. Tail cuneate; median rectrices sometimes lengthened beyond the rest. Tarsi short, covered anteriorly with downy feathers; feet small, bare, the hallux extremely short, almost obsolete, not reaching the ground.

### Key to the Species.

- A. Without pectoral band.
  - a. Front and chin black ..... 1. *Pt. personatus*.
  - b. Loral space black; throat yellowish, bordered on its lower edge with a band of black; breast greenish-grey; abdomen chestnut ..... 2. *Pt. gutturalis*.
  - c. Stripe on each side of forehead, from nostril to above the eye, chin, and centre of throat black ..... 3. *Pt. coronatus*.
  - d. Lores and band encircling back of head pearly-grey; cheeks, ear-coverts, and throat orange yellow; centre of abdomen black ..... 4. *Pt. senegalus*.
  - e. Top of head yellowish-brown, streaked with black; throat pearly-grey; underparts rufous, spotted with white..... 5. *Pt. variegatus*.
- B. With pectoral band.
  - a. Without black bar on forehead.
    - a'. Median rectrices not lengthened much beyond the rest.  
Upper part of throat and sides of neck rufous; lower portion of throat black; band on lower part of breast; abdomen and flank black ..... 6. *Pt. arenarius*.
    - b'. Median rectrices greatly lengthened beyond the rest.
      - a''. Throat yellow; black band across breast; abdomen and flanks chestnut ..... 7. *Pt. exustus*.
      - b''. Throat and stripe behind the eye black; sides of throat rufous; centre of breast chestnut, bordered above and below with black; rest of underparts white ..... 8. *Pt. alchata*.
      - o''. Throat orange-yellow; breast crossed by a white and a chestnut band; abdomen rufous brown ..... 9. *Pt. namaqua*.
  - b. With black bar across forehead.
    - a'. Breast uniform greenish buff.
      - a''. Lower part of breast bordered with a chestnut band, succeeded by a white one; rest of underparts yellowish-white, barred narrowly with black; wing-coverts with two black bands, margined on the upper side only with white ..... 10. *Pt. fasciatus*.

- b''*. Lower part of breast bordered with a rather broad white band, succeeded by a broad black one; rest of underparts yellowish-white, irregularly barred with black ..... 11. *Pt. bicinctus*.
- c''*. Lower part of breast crossed by four bands, first a maroon one, succeeded by a white one, then a black, and lastly a white one, alternating; wing-coverts with only one black band, margined on both sides with white ..... 12. *Pt. quadricinctus*.
- b'*. Throat pale buff; upper part of breast buff, crossed with numerous narrow black bars; middle of breast uniform buff, crossed in centre by a narrow black bar, and another of the same hue on its lower edge; rest of underparts yellowish-white, barred narrowly with black... 13. *Pt. lichtensteini*.
- c*. Black bar on forehead, divided in the centre by a white spot; throat and abdomen black; black bar crosses the breast, between which and the abdomen is a broad white band ..... 14. *Pt. decoratus*.

#### 1. PTEROCLES PERSONATUS.

*Pterocles personatus*, Gould, Voy. 'Sulphur,' Zool. pl. 30 (1843); id. P. Z. S. (1843), p. 15; Gray, Gen. B. vol. iii. p. 519 (1845); Reich. Syn. Av. Gallinæ (1851), pl. ccviii. figs. 1821, 1822.

*Hab.* Madagascar.

This is one of the largest species of the genus, readily recognized from its relatives by the entirely black forehead and chin. M. Grandidier informs me that it is very abundant in Madagascar, where he has shot many, and that its flesh is palatable. In its economy and habits it does not differ from the other members of the genus.

*Male*. Forehead and chin jet black. Lower part of throat and sides of face buffy-white. Top of head, occiput, upper part of back and breast dark isabelline or vinous. Middle of back dark brown, greyish tinge on some feathers; rest of back, rump, and upper tail-coverts black, barred narrowly with light buff. Wings uniform, like the breast; a few of the greater coverts tipped with brownish black, forming three irregular bars upon the wing. Inner secondaries dark grey, tipped with vinous. Primaries dark chocolate-brown, with light edges on the inner webs. Abdomen, flanks, and vent barred narrowly with black and rufous; the feathers nearest the breast barred with black and buffy white. Under tail-coverts light chestnut. Tail brownish black, barred with white (these broadest and most numerous on the outer webs), the feathers largely tipped with white. Bill apparently bluish, with dark tips. Feet black.

Total length  $13\frac{3}{4}$  inches; wing  $9\frac{3}{4}$ , tail 5, bill along gape  $\frac{3}{4}$ .

*Female*. Throat and sides of face buffy white; breast vinous. Entire upper parts and wings pale buff, barred irregularly with black. Primaries dark brown, with light edges and tips. Flanks and



chest barred with white and black; abdomen and vent barred with rufous and black. Under tail-coverts ochraceous. Tail blackish brown, barred and largely tipped with yellowish white. Bill and feet blue-black.

Total length  $11\frac{3}{4}$  inches; wing  $8\frac{1}{2}$ , tail  $4\frac{1}{4}$ , bill along gape  $\frac{5}{8}$ .

A young bird differs from the female in having the breast vinous in the centre, pale buff on the sides, each feather with two narrow brown bars. Abdomen, flanks, and vent chestnut, barred sparingly with black. Wings very pale buff, barred with black. Rest of plumage as in the female.

## 2. PTEROCLES GUTTURALIS.

*Pterocles gutturalis*, Smith, Ill. S.-Afr. Zool. (Birds), pl. 3 ♂, pl. 31 ♀ (1849); Gray, Gen. B. vol. iii. p. 519 (1849); Reich. Syn. Av. Gallinæ (1851) pl. ccx. figs. 1829, 1830; von Heugl. Syst. Uber. Vög. N.O.-Afr. (1855) p. 304; Parker, Proc. Zool. Soc. (1862) p. 258; id. Journ. für Ornith. (1862) p. 286; Layard, Birds S. Afr. (1867) p. 278; id. Ibis (1868) p. 269; Ayres, Ibis (1869) p. 297; Blanford, Geol. & Zool. Abyss. (1870) p. 421; Von Heugl. Ornith. Nordost-Afr. Band ii. (1873) p. 862; Buckle, Ibis (1874) p. 385.

*Hab.* Kurrichaine, South Africa (*Smith*); Trans-Vaal (*Ayres*, *Buckley*); Adoa and Axum to Shoa, Abyssinia (*Heuglin*); Agula, Antalo, Abyssinia (*Blanford*).

This fine species of Sand-Grouse was first described by Sir A. Smith (*l. c.*), who obtained it about eighty miles to the eastward of Latakoo, his attention having been drawn to the bird by its cry, which was very different from that of *P. namaqua*, and resembled the syllables *tweet-tweet*. Like all the other species they resorted to the water in large flocks, but when feeding were dispersed and observed only singly or in pairs. Grass-seeds and abundance of gravel were found in the stomachs of the individuals that were killed. The eggs, which are two or three in number, are laid upon the bare ground; and the young take to a wandering life almost immediately after they are hatched.

In Abyssinia Mr. Blanford considers this species to be local, as he only saw it in two or three places in the highlands, at Agula and Antalo; and Rüppell mentions it only at Shoa, though Von Heuglin procured it near Adowa.

Mr. Ayres states that in the neighbourhood of Potchefstroom, in the territory of the Transvaal, this species is abundant towards the end of winter and beginning of spring. Their flight is strong, resembling that of Pigeons; and when alarmed, they do not run, but lie close to the ground, from which they take wing at once. Their notes, uttered only on the wing, are harsh, and may be heard at a considerable distance. They feed upon a species of tare or pea, and upon bulbous roots of a species of grass; from the aromatic properties of these last the birds, after feeding freely upon them, are thoroughly scented. Iris is dusky-brown. The egg is " $1\frac{2}{16}$  in. by  $\frac{1\frac{3}{16}}{16}$  in.; the ground-colour is dusky-tawny, marked with lines and

blotches of umber, especially towards the base of the egg, where these marks form an encircling zone."

*Male.* Black stripe from nostrils to the eye; sides of head, neck, and throat pale buff; a black line encircles the lower part of the throat, and extends onto the back of the neck, where it is broadest. Top of head dark brown; back of neck pale greenish yellow. Breast dark greyish buff, with a wash of green. Entire rest of underparts chestnut. Back and inner secondaries greenish grey. Wing-coverts brownish grey, the greater ones tipped with ochraceous. Primaries dark brown, with pale edges. Median rectrices greenish grey; lateral ones black, tinged with ochraceous on edge of outer web, and tipped with light rufous. Under tail-coverts bright chestnut. Iris deep brown. Bill and feet black.

Total length  $11\frac{3}{4}$  inches; wing 9, tail  $4\frac{3}{8}$ , bill along gape  $\frac{3}{4}$ .

*Female.* Top of head black; feathers margined with light buff. Back of neck buff, with a central streak of black. Feathers of back, wings, and breast black, with a large buff spot on each web at the tip, those on lower part of back and wings being rather circular in form, giving those parts a spotted appearance, while the breast and upper part of back seem to be streaked with broad black lines on a buff ground. Secondaries black, scalloped on the edges, and tipped with light buff. Primaries blackish brown. Flanks, abdomen, thighs, and vent deep rufous, narrowly barred with black. Tail black, barred with deep buff along the margins of the webs, and tipped with reddish buff. Upper tail-coverts like the back; under coverts deep chestnut, barred on their basal half with black. Bill and feet black.

Total length 11 inches, wing 9, tail 4, bill along gape  $\frac{3}{4}$ .

### 3. PTEROCLES CORONATUS.

*Pterocles coronatus*, Licht. Verz. d. Doubl. (1823) p. 65; Temm. Planch. Color. (1825) nos. 339, 340; Rüpp. Neue Wirbelth. (1823-1835) p. 114; Wagl. Syst. Av. (1827) *Pterocles*, sp. 4; Gray, Gen. B. vol. iii. p. 519 (1849); Reich. Syn. Av. Gallinæ, pl. ccviii. figs. 1815, 1816 (1851); Heugl. Syst. Über. N.O.-Afr. (1855) p. 304; Tristr. Ibis (1860) p. 71; Von Heugl. Journ. für Ornith. (1862) p. 415; Hartm. Journ. für Ornith. (1863) pp. 303, 307; Adams, Ibis (1864) p. 27; Allen, Ibis (1864) p. 240; Wyatt, Ibis (1870) pp. 9, 16; Shelley, Ibis (1871) p. 144; id. B. Egypt (1872) p. 221; Hume, Str. Feath. (1873) vol. i. p. 224; Von Heugl. Ornith. Nordost-Afr. (1873) Band ii. p. 863; Wise, Str. Feath. (1876) vol. iv. p. 230.

*Hab.* Rare in Egypt and Nubia (*Shelley*); southern parts of the Sahara (*Tristram*); El Kab, Egypt (*Allen*); Nubia and Kordofan (*Heuglin*); Nubia and Arabia (*Rüppell*); Plain of El Goa, Sinai (*Wyatt*); Jacobabad, N.W. Sindh (*Hume*); Kurrachee district (*Wise*).

According to *Tristram* this Sand-Grouse is confined to the more southern portions of the Sahara, where it supplants *P. arenarius*. He only met with it in parties of four or five; and the egg was of an

ashy white with a few almost obliterated pale-brown markings. In Egypt Capt. Shelley found this species to be rare, and also in Nubia; and he does not think it goes into the Delta. Dr. Adams met with it at the Second Cataract; and when at El Kab, Mr. Allen killed a pair out of a flock that came down to drink at a pool. Their cry was hoarser than that of the common species (*P. exustus?*).

*Male.* A line on each side of the forehead, from the nostril to above the eye, chin, and a narrow line down the centre of the throat jet black. A pearly grey band on each side of the occiput, meeting at the back of the neck. Centre of forehead white. Top of head vinous. Sides of neck, throat, and lower part of neck behind orange. Upper parts and wings vinous, with the tips of the wing-coverts pale buff, surrounded by a dark grey margin on the inner side. Primaries dark brown, with the tips of the 5th to 9th buffy-white; shafts of first two pure white, of the rest brownish white. Entire underparts pale sandy-buff, darkest on the middle of abdomen and vent. Median rectrices not extending beyond the rest, vinous. Lateral feathers pale rufous, with a subterminal bar of black, and white tips. Bill bluish. Feet dark brown.

Total length 10 inches; wing  $7\frac{1}{2}$ , tail  $3\frac{1}{2}$ , bill along gape  $\frac{5}{8}$ .

*Female.* Throat and sides of the neck orange, palest on the chin. Entire upper parts sandy buff with a vinous tinge, barred narrowly with black. Wings paler buff, irregularly barred with fine black lines, broadest and most conspicuous on the scapulars and some of the inner secondaries. Breast and underparts very pale buff, almost white upon the flanks, each feather margined with pale brown. Under tail-coverts yellowish white. Tail vinous, with a subterminal black bar, and white tip.

Total length 10 inches, wing  $7\frac{3}{4}$ , tail  $3\frac{1}{2}$ , bill along gape  $\frac{5}{8}$ .

#### 4. PTEROCLES SENEGALUS.

*Tetrao senegalus*, Linn. Mantissa (1771) p. 526; Lath. Ind. Orn. vol. ii. p. 642.

*La Gélinoite de Sénégal*, Buff. Planch. Enlum. p. 130.

*Pin-tailed Grouse*, var. A, Lath. Gen. Syn. (1783) p. 748.

*Senegal Grouse*, Lath. Gen. Hist. B. vol. viii. (1823) p. 253.

*Pterocles guttatus*, Licht. Verz. d. Doubl. (1823) p. 64; Rüpp. Neue Wirbelth. (1823–1835) p. 114; Wagl. Syst. Av. (1827), *Pterocles*, sp. 8; Less. Trait. Ornith. (1831) p. 517. sp. 8; Allen, Ibis (1864) p. 240; Gould, B. Asia, pt. iii. pl. 6; Hume, Ibis (1872) p. 468; Von Heugl. Ornith. Nordost-Afr. Band ii. (1873) p. 860.

*Pterocles senegalensis*, Shaw, Nat. Misc. vol. iv. pl. 933; Taylor, Ibis (1859) p. 50, (1867) p. 67; Heugl. Syst. Uebers. Vög. Nordost-Afr. (1855) p. 304; Speke, Ibis (1860) p. 247; Tristr. Ibis (1868) p. 211; Taczanow. Journ. für Ornith. (1870) p. 51; Shelley, Ibis (1871) p. 144.

*Pterocles senegalus*, Gray, Gen. B. vol. iii. p. 519 (1845); Tristr. Ibis (1860) p. 71.

*Pteroclorus senegalus*, Bon. Compt. Rend. (1856) vol. xlii. p. 880; Reich. Syn. Av. Gallinæ (1851) pl. ccx. figs. 1831, 1832.

*Pterocles senegalus*, Shelley, B. Egypt (1872) p. 220; Hume, Str. Feath. (1873) vol. i. p. 221; James, Str. Feath. vol. iii. (1875) p. 418; Butler, Str. Feath. (1875) vol. iii. p. 4, (1877) vol. v. p. 231.

*Fukee*, Somali (Speke).

*Hab.* Egypt (*Shelley*); extreme south of the Sahara (*Tristram*); Somali country, East Africa (*Speke*); Egypt and Nubia (*Rüppell*); Palestine (*Tristram*); Sindh, Northern Guzerat, along the shores of the Runn of Cutch (*Hume*).

Canon Tristram states that this species is confined to the extreme south of the Sahara, but is more plentiful there than *P. coronatus*. He obtained one nest; and the egg had a ground-colour similar to that of *P. alchata*, but was scarcely more than half the size, and had very faint brown spots.

In the Somali country Capt. Speke met with this Sand-Grouse on the plateau in large flocks. In Sindh Mr. Hume found this species in certain localities to be very numerous. Their habits are very much like those of other Sand-Grouse, keeping together in parties of from fifty to sixty; and very often in winter a flock consists of one sex only. They trot about on the dry soil, picking up seeds and insects, or squat and enjoy the warmth of the morning sun. They seemed to be less pugnacious than some of the other species, as, although he watched them closely, he did not observe the perpetual skirmishing among the males, such as he had noticed took place with those of *P. arenarius* in the Punjaub. It is probable that this species breeds in Sindh.

*Male.* General plumage sandy buff. Lores and a band encircling the back of the head pearly grey. Underparts sandy-buff, washed with grey on the breast. Middle of abdomen black. Basal portion of scapulars, greater wing-coverts, and secondaries dark brown, tips buff. Primaries pale buff, graduating into brownish black towards the tips, which are buff. Central rectrices lengthened beyond the rest, pale buff, apical half black; lateral ones greyish brown, with a subterminal black band and white tips. Bill and feet lead-colour.

Total length  $12\frac{1}{2}$  inches, wing  $7\frac{1}{2}$ , tail  $\frac{5}{8}$ , bill along gape  $\frac{5}{8}$ .

*Female.* Throat and sides of neck orange, lighter on the chin. Entire upper parts and wings sandy-buff, covered with black spots. Primaries sandy-buff, graduating into dark brown near the ends, and tipped with pale buff. Underparts bright buff, spotted on the breast with dark brown. Centre of abdomen black. Upper tail-coverts like the back. Median rectrices buff, faintly barred with black, their elongated tips brownish-black. Lateral feathers pale brown, lightest on the outer webs, with a subterminal brownish-black bar, and white tips. Bill dark horn-colour. Feet dark brown.

Total length  $11\frac{1}{2}$  inches, wing 8, tail  $4\frac{3}{4}$ , bill at gape  $\frac{1}{2}$ .

##### 5. PTEROCLES VARIEGATUS.

*Pterocles variegatus*, Burch. Trav. S. Afr. vol. ii. p. 345 (1822); Gray, Gen. B. vol. iii. p. 519 (1849); Reich. Syn. Av. Gallinæ



(1851) pl. cex. figs. 1833, 1834; Strickl. & Selat. Contr. Ornith. (1852) p. 157; Lay. B. S. Afr. (1867) p. 279; id. Ibis (1868) p. 269, (1869) p. 375; Ayres, Ibis (1871) p. 262; Anderss. B. Dam.-l. (1872) p. 242.

*Pterocles maculosus*, Smith, Ill. S.-Afr. Zool. vol. ii. p. 345 (1822); Gray, Gen. B. vol. iii. p. 519 (1845).

*Hab.* Between Latakoo and the Tropics, South Africa (*Smith*); banks of the Limpopo and Mariqua (*Ayres*); Damaraland (*Andersson*).

*Male.* Throat and sides of face pearly-grey. Top of head and occiput deep buff streaked with black. Upper parts and wings brownish-black, tipped with yellowish-ochre, and spotted with white; the tips of the greater coverts, however, are reddish-ochre. Primaries brownish black, with light edges. Breast and entire underparts bright rufous, each feather with a subterminal white bar. Tail brownish-black, barred with light buff, and tipped with yellowish ochre. Bill black, feet yellowish-brown.

Total length  $9\frac{1}{2}$  inches, wing  $6\frac{3}{4}$ , tail  $3\frac{1}{2}$ , bill along gape  $\frac{1}{2}$ .

*Female.* Top of head bright buff, streaked with dark brown. Sides of head and throat bright uniform buff. Feathers of the back and wings blackish-brown, tipped with light yellowish-brown, and with two or three white bars on the webs, which do not, however, reach the shaft, and give to the back the appearance of being spotted with white. Primaries blackish-brown, edged at the tip with white. Breast reddish-buff, indistinctly barred with white. Underparts dull white, barred with pale brown. Upper tail-coverts like the back. Tail brownish-black, barred and tipped with light buff. Under tail-coverts uniform light buff. Bill black; feet yellowish-brown.

Total length  $9\frac{3}{8}$  inches, wing  $6\frac{3}{4}$ , tail  $3\frac{1}{2}$ , bill along gape  $\frac{1}{2}$ .

#### 6. PTEROCLES ARENARIUS.

*Tetrao arenaria*, Pall. Nov. Comm. Petropol. vol. xix. p. 418, tab. 8 (1774); id. Itiner. vol. iii. App. p. 699, no. 271; id. Zoogr. Rosso-Asiat. vol. ii. p. 73, pl. (1831); Lath. Ind. Orn. vol. ii. p. 642 (1790); Bonnat. Ency. Méth. tom. i. p. 200 (1790).

*Sand-Grouse*, Lath. Syn. vol. ii. pt. 2. p. 751 (1783); id. Gen. Hist. B. vol. viii. (1823), p. 254.

*Tetrao fasciatus*, Desfont. Mém. de l'Acad. des Sc. p. 502 (1787).

*Aragonian Partridge*, Lath. Syn. Suppl. p. 223 (1787).

*Perdix aragonica*, Lath. Ind. Orn. p. 645 (1790); id. Gen. Hist. B. vol. viii. (1823) p. 256 B.

*Pterocles arenarius*, Temm. Pig. et Gallin. vol. iii. (1815) pp. 240, 712; id. Planch. Col. nos. 52, 53; id. Man. Ornith. (1820) vol. ii. p. 476, vol. iv. p. 330; Wagl. Syst. Av. (1827) *Pterocles*; Less. Trait. Ornith. (1831) p. 516, sp. 1; Fras. Proc. Zool. Soc. (1839) p. 121; Gray, Gen. B. vol. iii. p. 518 (1849); Blyth, Cat. B. Mus. Asiat. Soc. (1849) p. 249; Reich. Syn. Av. Gallinæ (1851) pl. cccii. figs. 1809-12; Adams, Proc. Zool. Soc. (1858) p. 501; Salv. Ibis (1859) p. 352; Tristr. Ibis (1860) p. 69, (1868) p. 211; Irby, Ibis (1861) p. 223; Jerd. B. Ind. vol. iii. p. 496;

Bree, B. Eur. vol. iii. p. 226, pl. (1862); Tristr. Proc. Zool. Soc. (1864) p. 449; Lilford, Ibis (1866) p. 379; Drake, Ibis (1867) p. 428; Smith, Ibis (1868) p. 450; Taczanow. Journ. für Ornith. (1870) p. 51; Saund. Ibis (1871) p. 223; Rey, Journ. für Ornith. (1872) p. 154; Godman, Ibis (1872) p. 219; Garrod, Proc. Zool. Soc. (1873) pp. 468, 639, (1874) p. 254; Hume, Str. Feath. vol. i. (1873) p. 219; Krüper, Journ. für Ornith. (1875) p. 282; James, Str. Feath. vol. iii. (1875) p. 418; Butler, Str. Feath. (1876) vol. iv. p. 4, (1877) vol. v. p. 231; Dresser, Ibis (1876) p. 322; Schallow, Journ. für Ornith. (1876) p. 186; Scully, Str. Feath. (1876) vol. iv. p. 179?; Danf. Ibis (1877) p. 273.

*Tetrao subtridactyla*, Hasselq. It. p. 250.

*Tuturuk*, *Boora-kurra*, in Afghanistan (Jerdon). *Bukt-titar*, *Bakht-tit*, *Buklit*, also *Ban-chur-Kurmoor*, at Peshawur (Jerdon). *El Koudhre*, Arabic (Tristram). *Corteza*, near Seville (Saunders). *Ortega Churra*, in Spain (Lilford). *Barrigra negra* in Portugal (Smith). *Beghitak*, Yarkand (Scully).

*Hab.* Desert regions of Asia, Southern Europe, and North Africa (*Blyth*); plains of Fuerteventura, Gran Canary (*Godman*); Harak-ta plains of the Eastern Atlas, Djendeli, Madracen (*Salvin*); Sahara desert everywhere, except in the extreme south (*Tristram*); Erzeroum (*Dickson* and *Ross*); Asia Minor (*Danford*); Palestine (*Tristram*); very common in Jodhpoor, not uncommon in Sindh, fairly plentiful in eastern portions of Cutch, all along the eastern shores of the Rumm, and in the north-eastern portions of Kattiawar (*Hume*); Punjaub, N.W. Provinces, Bengal (*Adams*), Besharik, Yarkand, and Koshtak in Eastern Turkestan (*Scully*); Western Persia (*De Filippi*).

When in Yarkand Mr. Scully states (*l. c.*) that he heard of a bird called *Beghitak* by the natives, which lived in the desert ground, was yellowish brown in colour, and had feathered legs, and long pointed wings. Its blood was reputed a specific for consumption. Although he did not succeed in obtaining a specimen, yet once near Besharik he saw a pair at a distance, and the next day he saw three more, which appeared to be yellowish brown above, breast dove-colour, abdomen dark or black, and lower tail-coverts white. They were so wild and wary that he could not get a shot at them. Although he refers these birds to *P. arenarius*, it is more probable, as suggested by Mr. Hume, they were *Syrrhaptes paradoxus*.

Jerdon, in the 'Birds of India,' says that this Sand-Grouse is only found in the north-west provinces and Sindh, rarely extending so low as Allahabad, is tolerably abundant in the Punjaub, and stated to be very abundant on the edges of the great desert. He had also heard of its having been killed near Nusserabad and in Khandeish. It arrives at the end of September, and leaves in March, and is therefore only a winter visitor in India. It frequents sandy plains, flies in vast flocks, and, like others of the family, it regularly visits twice a day certain drinking-places, and is fond of basking in the sun and rolling in the sand. The flight of this species is very strong and swift; and sometimes it traverses great distances. It is a very shy bird, difficult of approach, and much esteemed as an article of food.

In flocks it is stated that one or other sex greatly preponderates; sometimes seven females are obtained to one male, and *vice versâ*.

Canon Tristram states (*l. c.*) that this species is universally distributed throughout the Sahara, except in the extreme south, where it gives place to *P. senegalus*. It has so much of the Plover-character that he took the first covey that he saw for large Plovers. He did not find it so wary as *P. alchata*; but when approached closely it would suddenly rise to a great height and fly for a long distance. The species lays three eggs of a pale fawn-colour, with obsolete pale brown blotches; they are elliptical in shape, and are placed two in a line, and the third lengthwise outside, in a depression in the ground. He observed that when the hen was sitting one wing was spread out to cover the eggs; and she thus presented a grotesque lopsided appearance. The flesh, although extremely white, was very poor and dry, without any flavour. In support of this testimony Capt. Irby says, in his paper "On the Birds of Oudh and Kumaon," that this bird, obtained by him near Hurdue, was uneatable and tended to confirm what the natives say, "that they live upon sand."

*Male.* Top of head and occiput dark brownish grey, with a pearly tinge, becoming a lighter grey on loreal space, around the eye, and ear-coverts. Upper part of throat and sides of neck chestnut, becoming deep orange towards the back of the neck. Lower part of throat in front black. Breast pearly grey, crossed on the lower part by a rather broad black band, succeeded by another of rich buff, which is widest on the sides near the wings. Rest of underparts jet-black. Feathers of the back and wing-coverts are rich buff, each feather with a subterminal greyish-black bar, and tipped with orange-yellow. Secondaries deep buff, the terminal third of outer web bright orange; some of the inner ones with a subterminal greyish-black bar like the coverts, and some with this colour only along the shaft. Greater wing-coverts orange-yellow on their apical third. Primaries greyish black. Upper tail-coverts like the back; under coverts black, tipped with white. Rectrices pale rufous, crossed with narrow black bars, and tips white. Thighs black; tarsi covered in front with buffy white feathers. Bill bluish. Feet brownish. Iris brown. Total length  $11\frac{3}{4}$  inches, wings  $9\frac{1}{4}$ , tail  $4\frac{1}{4}$ , bill along gape  $\frac{5}{8}$ .

*Female.* Top of head and occiput rufous, streaked with black. Upper part of throat and sides of head yellowish white, the feathers of the lores and ear-coverts with a fine central black streak; lower part of throat crossed by a blackish band. Breast rich buff, becoming buffy white near the abdomen, the feathers of the upper part, with a central streak and spot at the tip, black. A black band crosses the lower part, beneath which there are no spots. Rest of underparts black. Back and wings deep buff, crossed irregularly with narrow black lines; the greater coverts tipped with orange. Secondaries deep buff, barred narrowly with black, and all but the innermost ones with a broad band of deep orange on the outer webs at their tips. Primaries greyish black, edges whitish. Rectrices very

dark brown, crossed with narrow indistinct brownish-black lines, and tipped with buffy white. Under tail-coverts black, tipped with white. Thighs brownish black; tarsi covered in front with short buffy-white feathers. Bill brownish, with a black tip. Total length  $11\frac{1}{2}$  inches, wing 9, tail  $3\frac{3}{8}$ , bill along gape  $\frac{5}{8}$ .

A young bird from Erzeroum has the head, back, wings, and breast light buff, with a central line and one or more bars on each feather black, some crossing in a direct line, some in the shape of arrow-heads. Primaries greyish black, with buffy-white tips. Abdomen and flanks black. Middle rectrices light buff, crossed with numerous narrow curved black bars; the lateral ones greyish black along the shafts, buff on the outer margin, barred with black and tipped with white, this last increasing in extent as it goes towards the external feather. Under tail-coverts brownish black, and tipped with white.

#### 7. *PTEROCLES EXUSTUS*.

*Bahtuh Grouse*, Lath. Gen. Hist. Birds, vol. viii. (1823) p. 258.

*Pterocles senegalensis*, Licht. (nec Shaw), Verz. Doubl. p. 64 (1823).

*Pterocles exustus*, Tem. Pl. Col. (1825) nos. 354, 360; Wagl. Syst. Av. (1827), *Pterocles*, sp. 9; Rüpp. Neue Wirbeltl. (1823-35) p. 114; Less. Trait. Ornith. (1831) p. 517, sp. 9; Sykes, Proc. Zool. Soc. (1832) p. 154; Gray, Gen. B. vol. iii. p. 519 (1849); Blyth, Cat. B. Mus. Asiat. Soc. (1849) p. 249; Reich. Syn. Av. Gallinæ (1851) pl. ccix. figs. 1823-24; Jerd. Madr. Journ. vol. xii. p. 3; Hutt. Journ. Asiat. Soc. Beng. vol. xvi. p. 785; Burgess, Proc. Zool. Soc. (1855) p. 30; Von Heugl. Syst. Uebers. Vög. N.O.-Afr. (1855) p. 304; Hartl. Syst. Ornith. W.-Afr. (1857) p. 205; Adams, Proc. Zool. Soc. (1858) p. 502; Taylor, Ibis (1859) p. 50, (1867) p. 67; Irby, Ibis (1861) p. 235; Jerd. B. Ind. vol. iii. (1864) p. 502; Tristr. Proc. Zool. Soc. (1864) p. 449; Gould, B. Asia, pt. ii. pl. 13; Adams, Ibis (1864) p. 27; Allen, Ibis (1864) p. 240; Tristr. Ibis (1868) p. 211; Beavan, Ibis (1868) p. 378; Blanf. Geol. & Zool. Abyss. (1870) p. 410; Shelley, Ibis (1871) p. 153; id. B. Egypt (1872) p. 218; Lloyd, Ibis (1873) p. 415; Hume, Str. Feath. (1873) vol. i. p. 225; Adams, Str. Feath. (1873) vol. i. p. 392; Von Heugl. Ornith. Nordost-Afr. Band ii. p. 855 (1873); id. Journ. für Ornith. (1875) p. 57; Butl. Str. Feath. (1875) vol. iii. p. 4; Fairb. Str. Feath. (1876) vol. iv. p. 262.

*Pteroclorus exustus*, Ball, Str. Feath. (1874) vol. ii. p. 426.

*Bar-titar*, *Bakt-titar*, *Kumar-tit*, Hind.; *Kuhar*, N.W. Prov.; *Jam polanka*, Tel.; *Kal-Kondari*, Tam. (Jerdon). *Gutta* in Egypt (Adams).

*Hab.* N.E. Africa and Arabia (*Heuglin*); Egypt and Nubia (*Shelley*); Upper Egypt (*Adams*); Hindustan, Middle and Western Asia, Southern Europe, North Africa (*Blyth*); Abyssinia (*Blanford*); Senegal, Mus. Berl. (*Hartlaub*); Casamanze (*Verreaux*); Nubia and Abyssinia (*Rüppell*); Palestine (*Tristram*); India, gene-



rally in desert places, unknown in Malabar, in wooded districts of Central India, in Lower Bengal, and in Assam, Sylhet, and Burmah (Jerdon); Dukhun (Sykes); Punjaub (Adams); Ahmednagar district, Khandala (Fairbanks); Chotah Nagpur (Ball); Oudh (Irby); common in Sindh (Hume); Sambhur lake (Adams); Umballah and Morar (Beavan); Kattiawar (Lloyd).

This species, Capt. Shelley states (*l. c.*), is the most abundant of the various kinds of Sand-Grouse met with in Egypt, and ranges throughout that country, as well as Nubia. It goes in small flocks, uttering, when on the wing, a peculiar loud note which is heard for a considerable distance in the morning and evening, when on their way to their drinking-places. The localities in which he found them most abundant were Fayoom, Golosaneh, Karnak, and between Silsilis and Kom Ombo. Its nest is simply a hole in the sand, lined with dried grass; and it breeds in April.

According to Jerdon this is the most common Sand-Grouse found in India, and is met with in every part of the country, except in the wooded districts. It frequents the open plains and ploughed lands or fallow fields. This species feeds early in the morning, and between eight and nine o'clock goes to drink, and again visits the water at about four o'clock in the afternoon. At such times thousands congregate at these places; and they come from all quarters, flying at a great height, and announcing their presence by a peculiar loud piercing call. They stay but a moment at the water-side, and then fly off. They are difficult to approach, and when on the ground can hardly be distinguished from it, the colour of their plumage assimilating so closely. This Sand-Grouse feeds on various hard seeds, especially of the *Alysicarpi*, *Desmodium*, &c., as well as on grass-seeds and grain. It breeds in the Deccan and Southern India from December to May, and still later in Central India. The eggs are laid on the bare ground, and are of a greenish colour, thickly spotted with grey and brown, and nearly of the same thickness at both ends. If kept some time after being killed, this bird is very good as an article of food. In Oudh, says Capt. Irby, this species is very common on the sandy plains from January to July. Two eggs, which he found in June, resembled in size and markings those of *Caprimulgus europæus*; and if there had been any trees near the place, he would have referred them to some species of Goatsucker. Dr. Adams says that this bird, when wounded, spreads out its tail and wings, hiding its head under the breast, and emits a series of chuckles, like a fowl. As with the same species in India, he found the flesh very dry, and the only possible way of making them fit for the table was to remove the skin before cooking them.

*Male.* Head, neck, entire upper parts, and breast sandy buff, lightest on the breast, and having a greenish shade on the back. Throat orange. Across the breast at the shoulders is a narrow black band, occasionally edged on its upperside with white. Rest of underparts bright chesnut, with the centre of the abdomen black. Wings like the back, each feather margined at the tip with a narrow line of blackish chestnut, and the outer webs of secondaries and

greater coverts yellow on the terminal third. Some of the feathers also have a small white spot just beneath the dark line on the tip. Primaries brownish black; the inner ones tipped with white, broadest on the inner web. Central rectrices much lengthened beyond the rest, deep buff, indistinctly mottled with dark brown near the base, with an irregular scalloped subterminal black bar, then buffy white, and the lengthened narrow apical portion black. Lateral ones with the inner webs dark rufous brown; outer ones buff, barred with blackish brown, a subterminal black bar, and white tips. Under tail-coverts brownish black, with white tips. Thighs chestnut, tarsi covered in front with short buffy-white feathers.

Total length  $9\frac{3}{4}$  inches, wings 7, tail  $3\frac{1}{2}$ , bill along gape  $\frac{5}{8}$ .

*Female.* Top of head buff, darkest in the centre, each feather with a central line of black. Throat and loreal space pale orange-yellow. Sides and back of neck and breast bright buff, each feather with a wedge-shaped central black line, the widest part being at the tip, and also with another black bar crossing it in the centre. The feathers on the lower part of the breast are tipped with black, margined on the upperside with white, forming an irregular band across, below which there is an unspotted light buff space. Flanks, abdomen, thighs, and vent black, narrowly barred with rufous. Upper parts bright buff, barred narrowly with jet-black. Wing-coverts like the back, the lesser ones tipped with blackish chestnut, the greater ones broadly tipped with light yellow, forming a broad band on lower side of the wing when closed. Secondaries light buff, barred with black, the tips of outer webs of some of the outer secondaries light yellow. Primaries chocolate-brown, broadly tipped on inner webs with white. Upper tail-coverts like the back. Median pair of rectrices extended beyond the rest, attenuated for their terminal third, which is brownish black, the remaining portion being bright buff, barred narrowly with black; lateral feathers dark brown on inner webs, bright buff on outer, with numerous bars of black, and tips white. Under tail-coverts yellowish white, barred with black. Bill brownish black.

Total length  $11\frac{3}{4}$  inches, wing 7, tail to end of central rectrices  $4\frac{5}{8}$ , bill along gape  $\frac{5}{8}$ .

#### 8. PTEROCLES ALCHATA.

*The Little Pin-tailed Grouse*, Edw. Glean. p. 84, pl. 249 (1758).

*Tetrao alchata*, Linn. Syst. Nat. (1776) vol. i. p. 276; Gmel. Syst. Nat. (1788) vol. i. p. 754; Lath. Ind. Orn. vol. ii. p. 641 (1790); Bonnat. Ency. Méth. (1790) tom. ii. p. 203, pl. 92. fig. 3.

*Pin-tailed Grouse*, Lath. Gen. Syn. (1783) vol. ii. pt. 2nd, p. 748.

*Pterocles setarius*, Temm. Fig. et Gallin. vol. iii. pp. 256, 714 (1815); id. Mon. Ornith. vol. ii. p. 478 (1820), vol. iv. p. 330; Wagl. Syst. Av. (1829) *Pterocles*, sp. 6; Less. Trait. Ornith. (1831) p. 516. sp. 6; Parker, Proc. Zool. Soc. (1864) p. 258; Taczanow. Jour. für Ornith. (1870) p. 51.

*Ænas cata*, Vieill. Nouv. Dict. Hist. Nat. vol. xii. p. 418 (1817).

*Pin-tailed Grouse*, Lath. Gen. Hist. B. vol. viii. (1823) p. 250.

*Pterocles alchata*, Licht. Verz. Doubl. p. 64 (1823); Tristr. Proc. Zool. Soc. (1864) p. 449; Jerd. B. Ind. vol. iii. p. 500 (1864); Gould, B. Eur. pl. 258; Blyth, Cat. B. Mus. Asiat. Soc. (1849) p. 249; Gray, Gen. B. vol. iii. p. 518; Reich. Syn. Av. (1851) Gallinæ, pl. ccvii. figs. 1813-14; Heugl. Syst. Uebers. Vög. Nordost-Afr. (1855) p. 303; Salv. Ibis (1859) p. 352; Tristr. Ibis (1860) p. 70; Powys, Ibis (1860) p. 239; Wright, Ibis (1864) p. 139; Lilford, Ibis (1866) p. 379; Bartl. Proc. Zool. Soc. (1866) p. 78; Drake Ibis (1867) p. 428; Beaven, Ibis (1868) p. 377; Smith, Ibis (1868) p. 451; Hume, Str. Feath. (1873) vol. i. p. 221; Garrod, Proc. Zool. Soc. (1873) p. 468; Severzov, Journ. für Ornith. (1873) pp. 385, 386; Von Heugl. Ornith. Nordost-Afr. (1873) vol. ii. p. 853.

*Tetrao chata*, Pall. Zoogr. Rosso-Asiat. vol. ii. p. 73 (1831).

*Pterocles caspkins*, Ménétr. Cat. Rais. de Zool. p. 47 (1832).

*Pteroclorus alchata*, Bon. Compt. Rend. vol. xlii. p. 880 (1856).

*El-Guettha Arab* (Tristram). *Ganga* in Spain (Lilford). *El Koudre* in Tangiers (Drake). *Corticol* in Portugal (Smith).

*Hab.* Middle Asia, Afghanistan, Syria, Spain, N. Africa (*Blyth*); Portugal (*Smith*); common in Spain (*Lelford*); Tangier (*Drake*); Harakta Plains of Eastern Atlas (*Salvin*); Malta (*Wright*); Palestine (*Tristram*); Punjaub and Sindh (*Jerdon*); Jacobabad, Sindh, Nundan, near Altock, Peshawur valley, Abbotabad, and isolated localities in Huzara (*Hume*); Western Persia (*De Filippi*).

Jerdon says that this is a rare bird in India, only a few finding their way across the Sutlej. It flies in flocks, and is shy and wary. The specific appellation is taken from its Arabic name *El-chata* or *El-katta*; and in India there does not seem to be any special native name for the bird.

Tristram found this Sand-Grouse in vast flocks in winter in the Mزاب and Tonarick country; and, except in the breeding-season, it was very difficult to approach, and when packed it is necessary to be well-mounted to get a second shot. It is even more vigorous upon the wing than *P. arenarius*, and when on the ground is very garrulous. Its breeding-habits are exactly the same as those of the species just named; but the egg has a much richer fawn-coloured tint, and is covered and sometimes zoned with large maroon-red blotches.

In Spain, as stated by Lord Lilford (*l. c.*), this species, as well as *P. arenarius*, is common in many parts of the Castilles, La Mancha, Murcia, Andalusia, Estremadura, and in some districts of Aragon and Catalonia. They delight in bare and stony ground; and even in "hungry Spain" they are considered "muy male carne."

*Male.* Top of head and nape dark greyish brown; superciliary stripe and sides of the throat deep orange; ear-coverts yellowish; a black line goes from behind the eye and down the sides of the nape. Throat black; upper part of breast greenish buff; rest of breast chestnut, bounded above and below with a narrow black line; remainder of underparts white. The back has the feathers vinous at base, rest pale yellowish green, with a yellowish spot at tip.

Rump and upper tail-coverts buff, barred narrowly with black. Lesser wing-coverts pale vinous at base, then a narrow line of white followed by a broader one of pale chestnut, and then a narrow line of yellow, and tipped with pale chestnut. Some of the outer larger wing-coverts were like those just described; but the inner ones are dark, have the base dark ash, then rich yellow, and narrowly bordered with black. Inner secondaries rufous at base, barred with black, tipped with pale green, and a conspicuous yellow spot in the centre. Rest of secondaries pale yellowish-green, with yellow on their outer webs near the tips. Primaries ashy grey, margined on inner webs with white; the secondaries and tertiaries inclined to buff along the shaft on inner webs; shafts black. Tail-feathers buff, barred with black and tipped with white; the two central ones entirely black on their apical half, are extremely narrow, and extend far beyond the other rectrices. Under tail-coverts buff, barred with black, and tipped with white. Feathers of the tarsi white. Bill horn-brown. Bare space around the eye lead-colour; iris dark brown.

Total length  $13\frac{1}{4}$  inches, wing 8, tail to end of longest rectrices 6, bill along gape  $\frac{1}{16}$ .

*Female.* Top of head and back of neck deep buff, barred with black. Sides of face and neck orange-yellow. Chin and throat white. A black band around the lower part of neck, but not extending onto the back of the neck, beneath which is a broad light chestnut band bordered above and below with black as in the male. Entire underparts pure white. Upper parts buff, narrowly barred with black. Wing-coverts buff, barred with black, and with a grey spot on inner web near tip, this spot on some of the greater coverts being enlarged into a bar crossing the feathers near the tip. Secondaries buff, barred with black, and having a sub-terminal grey bar. Primaries like those of the males. Upper tail-coverts yellowish buff, irregularly barred with black. Rectrices like those of the male. Bill horn-colour.

Total length 13 inches, wing  $7\frac{3}{4}$ , tail  $5\frac{3}{8}$ , bill at gape  $\frac{5}{8}$ .

#### 9. PTEROCLES NAMAQUA.

*Namaqua Grouse*, Lath. Gen. Syn. B. (1783), vol. ii. pt. 2, p. 750; id. Suppl. p. 215; id. Gen. Hist. B. vol. viii. (1823) p. 251.

*Tetrao namaqua*, Gmel. Syst. Nat. (1788) vol. i. p. 754; Lath. Ind. Orn. vol. ii. p. 642, sp. 19; Sparrm. Voy. vol. i. p. 153; Bonnat. Enc. Méth. (1790) tom. ii. p. 204.

*Pterocles tachypetes*, Temm. Pig. et Gall. (1815) pp. 274, 715; Wagl. Syst. Av. (1827), *Pterocles*, sp. 7; Less. Trait. Ornith. (1831) p. 517, sp. 7; Layard, B. S. Afr. (1867) p. 277; Ayres, Ibis (1871) p. 262.

*Ænas namaqua*, Vieill. Nouv. Dict. Hist. Nat. (1817) vol. xii. p. 422.

*Pterocles simplex*, Less. Trait. Ornith. (1831) p. 517.

*Pterocles namaqua*, Gray, Gen. B. vol. iii. p. 518; Bocage, Journ. für Ornith. (1876) p. 303.



*Pteroclorus namaqua*, Reich. Syn. Av. *Gallinæ* (1851) pl. ccix.; Anderss. Dam.-l. (1872) p. 242.

*Hab.* Palestine (*Tristram*); Transvaal, between Potchefstroom and Marico (*Ayres*); Damara-land (*Andersson*).

Mr. Ayres first met with this species in the Transvaal between Potchefstroom and Marico, and afterwards along the river Limpopo, but nowhere very abundant. They squat on the approach of danger, and rise suddenly, with a quick beat of the wings; and their flight is very rapid. The iris is dusky, and eyelids yellow.

According to Layard, the Namaqua Grouse is very abundant on the Karroo plains throughout the Cape colony and in Namaqua-land. It congregates in small parties, runs with considerable swiftness, and the flight is very rapid. Its note, when on the wing, resembles the piping of a Plover, to which bird this species bears a considerable resemblance. It sometimes, during droughts, extends its migrations to the Cape Flats. It lays from seven to ten eggs, light cream-colour, spotted with brown and purple, axis 17<sup>'''</sup>, diameter 12<sup>'''</sup>. Andersson states that this bird is common in some parts of Damara-land, and generally comes to the water about eight or nine o'clock in the morning. They circle around at a considerable height, and frequently do not attempt to descend until directly over the spot, when they shoot down with great velocity, describing more or less of semicircles before they alight. They feed on seeds, berries, and small bulbs, and swallow gravel to assist the digestion.

*Male.* Top of head dark brown. Throat orange. Upper part of breast vinous, crossed on the lower part by a band of white, followed by another of reddish chestnut. Flanks dark vinous grey. Middle of abdomen chestnut; vent and under tail-coverts yellowish white. Upper parts dark brown, lighter on the rump and upper tail-coverts, and washed with green. Scapulars dark brown, with a subterminal light buff bar and purplish-grey tips. Wing-coverts ashy brown, subterminal buffy white bar, and chestnut tips. Secondaries dark vinous brown, inclining to light buff near their tips. Primaries rufous brown; shafts rufous, except those of first and second, which are white, and the sixth to tenth broadly margined with white on their inner webs towards their tips. Median rectrices extending slightly beyond the rest, rufous brown, graduating into dark brown on their attenuated portion; rest of tail rufous brown, and tipped with yellowish white. Bill horn-colour. Feathers on tarsus buffy white.

Total length 10 $\frac{5}{8}$  inches, wing 7, tail 4 $\frac{1}{2}$ , bill along gape  $\frac{1}{2}$ .

*Young male.* Differs in having the entire underparts very deep vinous buff, inclining to rufous on the abdomen, and ochraceous on the vent and under tail-coverts. Feathers of the back and wings barred with rufous and black irregularly, and tipped with greyish purple on the scapulars and some of the inner secondaries. Tail buff, barred narrowly with dark brown. Head, throat, and back of neck as in the adult males.

*Female.* Top of head, back, and sides of neck and breast deep

buff; feathers of the first with a central streak of black; those of the other parts barred irregularly with the same colour. Rest of underparts buffy white, graduating into light buff upon the flanks and lower tail-coverts, and all, except the last-named, barred narrowly with black. Upper parts buff, barred irregularly with narrow lines of black, and some of the scapulars tipped with greyish purple as in the male. Primaries same as the male. Median pair of rectrices slightly elongated beyond the rest, reddish-buff, barred narrowly with black, and with black tips; the lateral feathers blackish brown, with irregular reddish-buff bars on the outer webs, and with yellowish-white tips. On the inner webs the buff bars are very faintly indicated, and on some of the feathers they are obsolete. Bill horn-brown.

Total length  $9\frac{7}{8}$  inches, wing  $6\frac{5}{8}$ , tail  $4\frac{1}{4}$ , bill along gape  $\frac{1}{2}$ .

#### 10. PTEROCLES FASCIATUS.

*Tringa fasciata*, Scop. Delic. Faun. et Flor. Insubr. vol. ii. p. 92 (1786).

*Indian Grouse*, Lath. Gen. Syn. (1783) p. 752; id. Gen. Hist. B. vol. viii. (1823) p. 260.

*Tetrao indicus*, Gmel. Syst. Nat. (1788) vol. i. p. 755; Bonnat. Ency. Méth. (1790) tom. i. p. 201.

*Perdic indica*, Lath. Ind. Orn. vol. ii. p. 650, sp. 23 (1790).

*Enas indicus*, Vieill. Nouv. Dict. Hist. Nat. (1817) p. 422.

*Pterocles quadricinctus* (nec Temm.), Less. Trait. Ornith. (1831), p. 526, sp. 3; Sykes, Proc. Zool. Soc. (1832) p. 155; Burgess, Proc. Zool. Soc. (1855) p. 30.

*Pterocles fasciatus*, Gray, Gen. B. vol. iii. p. 518; Blyth, Cat. Birds Mus. Asiat. Soc. (1849) p. 249; Jerd. Ind. Ornith. pls. 10, 36; Reich. Syn. Av. Gallin. (1851) pl. ccviii. figs. 1815-16; Adams, Proc. Zool. Soc. (1868) p. 502; Jerd. B. Ind. vol. iii. p. 498 (1864); Gould, B. Asia, pt. ii. pl. 14; Beavan, Ibis (1868) p. 378; Lloyd, Ibis (1873) p. 415; Adams, Str. Feath. (1873) vol. i. p. 391; Ball, Str. Feath. (1873) vol. ii. p. 426; Fairb. Str. Feath. (1876) vol. iv. p. 262; Wise, Str. Feath. (1876) vol. iv. p. 230; Butler, Str. Feath. (1877) vol. v. p. 231.

*Handeri* in the south; *Boot-bur* in the north-west; *Sunda polanka* Tel. (Jerdon).

*Hab.* India generally, except Malabar and Lower Bengal (*Jerdon*); Dukhan (*Sykes*); Punjab (*Adams*); Deccan (*Burgess*); Khandesh (*Wise*); Morar, near Gwalior, Umballah (*Beavan*); Kattiawar (*Lloyd*); Hindustan generally (*Blyth*); Sambhur lake (*Adams*); Chota Nagpur (*Ball*); Ahmednagar district, Kandalia (*Fairbank*).

Jerdon (*l. c.*) states that this species is found over the greater part of India, but not in Malabar and Lower Bengal, and is not abundant anywhere. He had seen it in the Carnatic, the Deccan, and in Central India; and Adams records it as pretty common in the jungles around the base of the Sewalik range in the Punjab. Unlike other Sand-Grouse, it frequents thickets, and chiefly bushy and

rocky hills. \* It is generally met with in pairs, towards the end of the rains in parties of eight or ten, and when flushed rises with a low chuckling call, and after a short low flight drops again into cover. The eggs, cylindrical in form, are a dull earthy green, with a few dusky spots. It was procured in Kattiawar, Western India, by Capt. Lloyd, in the Than district, where one evening a small party, coming to drink after dusk, alighted in front of his tent. He thought they were Goatsuckers; and on firing at them was surprised to find he had secured a specimen of this Sand-Grouse. In the vicinity of Sambhur lake, Central India, Mr. Adams found this species common about all the low ranges of hills. The nest was simply a hollow scraped in the ground, with a number of small pieces of stone round the edge, and some loose grass for a lining. The number of eggs varied from two to three; in one instance, however, four were found. He gives their colour as very different from that mentioned by Jerdon, viz. a deep to pale salmon-colour when fresh; but, on being blown, in a few days this tint changes to a rich cream-colour, and the spots are light lavender and rusty. They are of a blunt oval form, 1·4 inch in length by 1 inch in breadth.

*Male.* A conspicuous black band crosses the forehead, below which, covering the nostrils and also over each eye, is a pure white spot. Top of head and occiput buff, streaked with narrow black lines. Sides of head, throat, neck, and upper part of breast uniform sandy buff. Upper part of back similarly coloured, but darker. Across the breast, extending from the shoulders of the wing, are, first, a band of deep chestnut, widest in the centre, succeeded by a broader one of light buff, beneath which is an irregular one of black. Rest of underparts black, narrowly banded with white or buffy white. Feathers of back and rump generally crossed by three black bars, and tipped with sandy buff; and between the first and second black bar from the tip is one of white. Shoulders uniform sandy buff. Wing-coverts and outer secondaries crossed by several black and white bars, forming two or three conspicuous bands across the wing, the tips of all the feathers being fulvous. The inner secondaries are buff, barred only with black, no white. Primaries brownish black, edged on both webs with whitish. Tail and under tail-coverts fulvous, barred with black. Bill red, orbital skin lemon-yellow; irides dark brown. Feet yellowish. Total length  $9\frac{1}{2}$  inches, wing 7, tail  $3\frac{1}{4}$ , bill at gape  $\frac{5}{8}$ .

*Female.* Throat and cheeks pale buff. Head reddish buff, streaked with black. Entire upper and under surface sandy buff, barred irregularly with brown. Tips of wing-coverts pale buff. Primaries and secondaries dark brown, edged on inner webs with white. Bill red. Dimensions about the same as the male.

#### 11. PTEROCLES BICINCTUS.

*La Gélinotte des Indes*, Sonner. Voy. aux Indes Orient. et à la Chine, vol. ii. pl. 96 (1782).

*Pterocles bicinctus*, Temm. Pig. et Gall. tom. iii. pp. 247, 713; Gray, Gen. B. vol. iii. p. 518.

*Enas bicincta*, Vieill. Nouv. Dict. Hist. Nat. vol. xii. (1817) p. 421; id. Gal. Ois. vol. ii. (1834) p. 60 (text).

*Double-banded Grouse*, Lath. Gen. Hist. B. vol. viii. (1823) p. 259.

*Pterocles bicinctus*, Wagl. Syst. Av. (1827) *Pterocles*, sp. 2; Less. Trait. Ornith. (1831) p. 516, sp. 2; Reich. Syn. Av. Gallinæ (1851) pl. ccviii. figs. 1819-20; Strickl. and Sclat. Contr. Ornith. (1852) p. 157; Layard, Birds S. Afr. (1867) p. 278; Ayres, Ibis (1869) p. 298; Gurn. Anderss. Birds Dam. L. (1872) p. 241; Buckley, Ibis (1874) p. 385; Bocage, Journ. für Ornith. (1876) p. 303.

*Hab.* Transvaal, near the Limpopo (*Ayres*); Limpopo, to the Matabili country (*Buckley*); Damara and Great Namaqua Lands (*Andersson*).

This is the most common of the Sand-Grouse found near the Limpopo, according to Mr. Ayres, with perhaps the exception of *P. gutturalis*. The greater number in June were in flocks, although some few had paired and were breeding. The eggs are laid on the bare ground, and are brownish pink, spotted and blotched all over, particularly at the thick end, with a lighter tint of the same colour. Size  $1\frac{6}{16}$  by  $1\frac{5}{16}$  inch. This species was also found to be very abundant from the Limpopo to the Matabili country by Mr. Buckley; and in the evening they come down in immense flocks to the water-holes to drink. During the day he met with them chiefly in pairs, or three individuals together; and when they rose from the ground they uttered a creaking note. According to Andersson, this species is very abundant in Damara and Great Namaqua Lands, and can always be met with during the dry season at any of the permanent watering-places to which they resort at morning and evening. When dispersed they usually go in pairs, and feed chiefly on the seeds of grasses and berries, mingling with their food considerable quantities of coarse sand.

Their flesh, though very white, is excessively tough, and it is best to skin the bird before cooking. The iris is deep red, the skin round the eye chrome-yellow.

The figure given by Sonnerat in his 'Voyage aux Indes Orientales et à la Chine' is evidently referable to this species; from having only two bands upon the breast, a white one succeeded by a black one, it cannot possibly represent *P. fasciatus*, Scop., to which it has been referred by some authors. In his text Sonnerat only mentions one band, the *white* one, which does not describe any species of Sand Grouse at present known. The locality, "côte de Coromandel," however, is not one of the habitats of the present species, so far as I am aware, as it is apparently solely found in Africa.

The specimens described by Temminck were given to him by Le Vaillant, who procured them in Namaqualand.

*Male.* Black bar across the forehead, in front of which and over each eye is a white spot, these latter sometimes coalescing and forming a white bar behind the black one. Top of head and occiput rufous, streaked with black. Throat, sides of neck, upper part of



back, breast, and shoulders of the wing uniform sandy buff, with a greenish tinge. Lower part of breast crossed by two rather broad bands, the upper one pure white, the lower jet-black. Rest of underparts barred narrowly with buffy white and brownish black. Feathers of the back rufous, barred with greyish black, those on the rump tipped with yellowish white. Greater wing-coverts and secondaries brownish grey, with a white spot at the tip of each feather. Primaries rufous-brown, all but the first two tipped with white. Tail, with the upper and under coverts, light buff, barred with brownish black. Bill reddish; feet yellow.

Total length  $9\frac{3}{4}$  inches, wing  $6\frac{5}{8}$ , tail  $3\frac{1}{2}$ , bill (along gape)  $\frac{5}{8}$ .

Another, younger male specimen differs in having a narrow black line over each eye, between it and the white mark, and also by having the back and inner secondaries deep rufous, irregularly barred with black, the wing-feathers tipped with buffy white. Outer secondaries blackish brown, like the primaries, some tipped on outer web with light buff, others with a subterminal bar of the same colour. The greater wing-coverts are blackish brown tipped with yellowish white.

*Female.* Head, back, neck, and breast buff, irregularly barred with brownish black, and tipped with buffy white on the back and breast. No band across the breast. Flanks, abdomen, and vent barred with white and black. Wings irregularly barred with black and reddish buff, the feathers tipped with white; primaries chocolate-brown. Tail and its coverts reddish buff, barred with black and tipped with fulvous. Bill reddish, tip black; feet yellowish.

Total length  $9\frac{3}{4}$  inches, wing 7, tail  $3\frac{1}{2}$ , bill along gape  $\frac{5}{8}$ .

## 12. PTEROCLES QUADRICINCTUS.

*Pterocles quadricinctus*, Temm. Fig. et Gallin. (1815) vol. iii. pp. 252, 713; Wagl. Syst. Av. (1827), *Pterocles*, sp. 3; Strickl. Proc. Zool. Soc. (1850) p. 220; id. Ann. & Mag. Nat. Hist. 2nd ser. vol. ix. p. 347; Heugl. Syst. Uebers. Vög. N.O.-Afr. (1855) p. 304; Hartl. Syst. Ornith. W.-Afr. (1857) p. 205.

*Enas bicinctus*, Vieill. (nec Temm.) Gal. Ois. pl. 220, nec text (1834).

*Pterocles tricinatus*, Swains. Birds W. Afr. (1862) vol. ii. pl. 23; Von Heugl. Ornith. Nordost-Afr. (1873) Band ii. p. 867.

*Hab.* Sennaar, Abyssinia (*Heuglin*); West Africa (*Strickland*).

Some confusion has been created in the synonymy of this species by Vieillot having figured it in his 'Galerie des Oiseaux' as *bicinctus* (a name given by Temminck to quite a different species), while in the text he has correctly described the true *bicinctus* and not the bird represented in his plate. Although Vieillot's figure only shows three bands across the breast, yet Temminck asserts, in the 'Planches Coloriées' (genre *Ganga*, footnote), that it is his *quadricinctus*; and as it is natural to suppose he knew his own species when he saw it, I have taken his determination as the correct one, more especially as I have never been able to find a specimen of *Pterocles* with four well-defined bands across the breast. So far as I can judge from the

specimens I have seen, the name *tricinctus*, given to this species by Swainson, is by far the most appropriate one; and it is to be regretted that it cannot be employed.

Temminck also refers to the present species the bird figured and described by Sonnerat, who, he states, was the first to make it known as La Gélinothe des Indes. In this determination I believe Temminck to have been mistaken, and that he confounded Sonnerat's bird with the *Pt. bicinctus* of Temminck. The species figured by Sonnerat has but two bands on the breast, a black and a white one; and I consider it to be the *Pt. bicinctus*, Temm., and have accordingly referred it to that bird.

The only habitats I can find for *Pt. quadricinctus* are Abyssinia and Sennaar on the east coast, while Swainson gives West Africa as the place whence his specimen came. It has never, so far as I am aware, been found in India. The examples described by Temminck were in the cabinet of M. de Breukelewaert at Amsterdam.

*Male.* Spot on the forehead, covering the nostrils, and one over each eye white. A broad black band crosses the forehead just in front of the eyes. Top of head and occiput fulvous, streaked narrowly with black. Throat yellowish white. Nape, sides of neck, and breast uniform sandy buff. Across the lower part of the breast are three bands, the first dark chestnut, the second white, and the third black. Temminck says there is a fourth one, of white. I do not perceive this in the specimens before me; but I am inclined to think individuals vary in the number of these bars. Underparts black, narrowly barred with white. Back deep buff, barred with jet-black. Wings fulvous, the shoulders uniform, not spotted. Wing-coverts and secondaries crossed by a *single black bar, margined on both sides with white*. The innermost secondaries have numerous black bars, and *no white ones*. Tail and under-coverts deep buff, barred with black. Bill red; feet yellow.

Total length  $9\frac{1}{2}$  inches, wing  $7\frac{1}{2}$ , tail  $3\frac{3}{4}$ , bill (along gape)  $\frac{5}{8}$ .

Specimen described from the White Nile.

*Female.* The entire top of head fulvous, streaked with black, and the back of neck spotted with the same. Throat white. Breast bright fulvous, without any bars, and the underparts barred with white and narrow lines of brownish black. Feathers of back and inner secondaries rufous, barred with black and margined with fulvous. Wings and outer webs of outer secondaries pale buff, crossed by several narrow jet-black bars. Inner webs of outer secondaries and primaries brownish black. Tail and its under-coverts deep buff, barred with black. Bill reddish horn-colour; feet yellow.

Total length  $9\frac{1}{4}$  inches, wing  $7\frac{1}{4}$ , tail  $3\frac{1}{4}$ , bill (along gape)  $\frac{5}{8}$ .

### 13. PTEROCLES LICHTENSTEINI.

*Pterocles lichtensteini*, Temm. Planch. Col. (1825) no. 355, 361 Rüpp. Neue Wirbelth. (1823-38) p. 114; Wagl. Syst. Av. (1827), *Pterocles*, sp. 8; Less. Trait. Ornith. (1831) p. 516. sp. 8; Gray, Gen. B. vol. iii. p. 518 (1849) partim; Reich. Syn. Av. Gallin. (1851) pl. ccix. figs. 1827-28; Heugl. Syst. Ubers. Vög. Nord-

ost-Afr. (1855) p. 304; id. Ibis (1859) p. 343; Speke, Ibis (1860) p. 247; Blanf. Geol. & Zool. Abyss. (1870) p. 419; Hume, Ibis (1872) p. 468; Finsch & Hartl. Vög. Ost-Afr. p. 563; Hume, Str. Feath. (1873) p. 219; Von Heugl. Ornith. Nordost-Afr. (1873) Band ii. p. 865; Wise, Str. Feath. (1876) vol. iv. p. 230.

*Pterocles bicinctus*, Licht. (nec Temm.) Verz. Doubl. (1823) p. 65.

*Hab.* Very common in the Danakil and Somali countries (*Heuglin*, *Speke*); Abyssinia (*Blanford*); Egypt and Nubia (*Rüppell*); Gool Mahomed Mehur, Upper Sindh (*Hume*); Kurrachee district (*Wise*).

Blanford (*l. c.*) states that the habits of this bird in Abyssinia are the same as those of the *Pt. fasciatus* of India. It is but rarely met with in the open plains, but keeps to bush- or tree-jungle, and in such places is usually found in pairs. The drinking-hours are at daybreak and at dusk; and the scene at a spring in the evening, he says, is very interesting, the birds coming in with a constant rush until dark. Single birds and small flocks, uttering a note like "queep-queep," would fly up and down the watercourse, keeping but a few feet above the bushes, the noise of their wings announcing their presence in the dusk before the birds themselves could be seen. Mr. Blanford says they are excellent eating, the flesh, though rather hard, being of a delicious flavour. The species appears to be confined to the coast region. In the Lebka valley, at Mohabar, only 2000 feet above the sea, but few were seen at the spring in the evening; and at higher elevations none were met with.

Mr. Hume relates, in 'Stray Feathers' (1873), that he met with this species at Gool Mahomed Mehur, Upper Sindh. Only one pair were seen and procured.

*Male.* Forehead white, crossed by a circular jet-black line, commencing at the opening of the mouth; over each eye a black spot. Throat pale buff. Centre of breast fulvous, with a narrow black bar crossing it in the middle, and another bordering it on the lower side. Rest of plumage of body buff or buffy white, barred narrowly with black. Wings barred with black and white and tipped with buff. Scapulars in some specimens dark buff or rufous, barred with black, in others like the rest of the wing-feathers just described. Primaries dark brown, edged with yellowish white. Tail pale buff, barred with black and tipped with yellowish buff, as are also the upper and under coverts. Iris brown; orbit lemon-yellow. Bill red; feet flesh-colour.

Total length 10 inches, wing  $7\frac{1}{4}$ , tail  $3\frac{1}{4}$ , bill along gape  $\frac{5}{8}$ .

*Female.* Throat pale buff, spotted minutely with blackish brown. Breast, wings, and back light buff, inclining to rufous on the secondaries, with all the feathers crossed by numerous narrow black lines. Primaries chocolate-brown. Abdomen, flanks, and vent dull white, barred narrowly with black. Tail with its coverts buff, barred with black. Bill light horn-colour; feet yellow.

Total length 10 inches, wing  $7\frac{1}{4}$ , tail  $3\frac{1}{4}$ , bill along gape  $\frac{5}{8}$ .

## 14. PTEROCLES DECORATUS.

*Pterocles decoratus*, Cab. Journ. für Ornith. (1868) p. 413 ; id. Von der Deck. Reis. vol. iii. p. 43, pl. 13 (1869) ; Finsch & Hartl. Vög. Ost-Afr. p. 565 ; Von Heugl. Ornith. Nordost-Afr. (1873) Band ii. p. 870.

*Hab.* Interior of East Africa, Lake Jipe.

I have never seen a specimen of this bird, and only know it from Cabanis's description and figure. He compares it to *tricinctus*, Swains. (= *quadricinctus*, Temm.), but says it is smaller, and gives no description of the wings. It is, however, a very distinct species, and can easily be recognized by the characters given below, most of which are not found in any other known species.

*Male.* Centre of forehead white, a large spot on each side and throat black. Top of head, neck, and back reddish grey, crossed with narrow lines of black. Superciliary stripe buffy white. Sides of head and breast sandy buff, with a greenish gloss, beneath which is an irregular black bar extending upwards to the shoulders of the wing, succeeded by a broad white band. Abdomen and flanks black, the feathers margined with rufous.

"Total length 9" ; bill along gape 7" ; wing 6.5" ; tail 2" 7".

## Genus SYRRHAPTES.

Body large, comparatively heavy. Bill rather small, delicate, pointed at tip ; culmen slightly curved, gonys ascending. Nostrils basal, hidden in feathers. Wings very long, pointed, first primary longest ; primaries in one species filamentous. Tail cuneate, median pair of rectrices always lengthened beyond the rest, apical portion attenuated and pointed. Tarsus short, entirely covered by short feathers. Feet tridactyle ; hallux obsolete ; toes very short, completely hidden in feathers above ; the soles bare and scaly. Claws moderate, curved and acute.

*Key to the Species.*

- A. Median rectrices prolonged far beyond the rest.
  - a. Primaries filamentous. Breast uniform vinous, tinged with green on upper part, and crossed in the centre by an irregular bar formed of the narrow black lines at the tips of the feathers. Abdomen blackish... 1. *S. paradoxus*.
  - b. Primaries not filamentous. Upper part of breast buffy white, irregularly barred with black ; rest of underparts pale buff, becoming white on the under tail-coverts ..... 2. *S. tibetanus*.

## 1. SYRRHAPTES PARADOXUS.

*Tetrao paradoxus*, Pall. Reis. Russ. Reichs, vol. ii. App. p. 712, tab. F (1773) ; Gmel. Syst. Nat. (1788) vol. i. p. 755. sp. 30 ; Lath. Ind. Ornith. vol. ii. p. 643. sp. 20 (1790) ; Bonnat. Ency. Méth. (1790) tom. ii. p. 205, pl. 93. fig. 1 ; Pall. Zoogr. Rosso-Asiat. vol. ii. p. 74 (1831).

*Heteroclitus Grous*, Lath. Gen. Syn. Birds, vol. iv. p. 753 (1783) ; id. Gen. Hist. Birds, vol. viii. (1823) p. 261.



*Syrrhaptes paradoxus*, Illig. Prodr. (1811) p. 243.

*Syrrhaptes pallasii*, Temm. Pig. et Gallin. vol. iii. pp. 282, 716 (1815); id. Planch. Col. 95.

*Heteroclitus tartaricus*, Vieill. Nouv. Dict. Hist. Nat. vol. xiv. p. 453 (1817).

*Syrrhaptes paradoxus*, Licht. in Evers. Reise nach Buch. p. 134 (1823); Gray, Gen. B. vol. iii. p. 519; Reich. Syn. Av. Gallin. (1851) pl. ccvii. figs. 1807-8; Moore, Ibis (1860) pl. iv. p. 105; Swinh. Ibis (1861) p. 341; Newt. P. Z. S. (1861) pp. 203, 397; Wortley, P. Z. S. (1861) p. 196; Parker, P. Z. S. (1862) p. 257, (1863) p. 516; Swinh. P. Z. S. (1863) p. 306; Radde, Reis. S. O.-Siber. (1863) vol. ii. p. 287, pl. xiv. fig. 3 (egg); Newt. Ibis (1864) p. 185; Salvad. Ibis (1864) p. 228; Von Droste, Journ. für Orn. (1868) p. 406; Müll. Journ. für Orn. (1869) p. 118; Von Homey. Journ. für Orn. (1870) p. 170; Malmgr. Journ. für Ornith. (1870) p. 295; Fritsch, Journ. für Orn. (1871) p. 312; Swinh. P. Z. S. (1871) p. 398; Severzov, Journ. für Orn. (1873) p. 380; Von Heugl. Journ. für Orn. (1874) p. 399; Taczanow. Bull. Soc. Zool. France (1876) vol. i. p. 241; Dress. Ibis (1876) p. 322; id. B. Eur. pt. 53 (1877) pl. ; Prjevalsky, in Rowl. Ornith. Misc. pt. ix. p. 382; David & Oust. Ois. de la Chine (1877) p. 389.

*Tetrao arenaria*, Pall. Zoogr. Rosso-Asiat. (1831) pl. 53, nec text.

*Syrrhaptes heteroclita*, Vieill. Gal. Ois. vol. ii. p. 64, pl. 222 (1834).

*Stepnaya kuritza*, Mongolia (Prejevalsky).

*Hab.* Tientsin, China (*Wortley*); Pekin and Tientsin (*Swinhoe*); Turkestan (*Severtzov*); Mongolia (*Prjevalsky*); Kirghis steppes, Donaria, plains of Petchely (*David & Oust.*).

Pallas's Sand-Grouse is essentially an Asiatic species, making its home in the arid Kirghis steppes, the great Gobi desert, and eastward through Mongolia to the plains between Pekin and Tientsin in North China, where it is especially numerous during the winter. The year 1853 is the earliest in which this bird's presence is recorded in Europe, Möschler having met with it at Sarepta, on the Volga (Naum. vol. iii. p. 305). In 1859 a few specimens were obtained in various parts of Western Europe; but in 1863 a great number of this species, estimated at many hundreds, suddenly appeared in many parts of Europe, constituting a veritable ornithological "Tatar" invasion, as it was aptly called by the historian of this remarkable event. The birds proceeded as far as Ireland, in the west, to the Færoes, in the north, and to Perpignan in France, to the south. Great numbers of them were killed; and it is doubtful if many survived to return to their eastern resorts. The cause of this singular migration has never been ascertained.

About the plains between Peking and Tientsin, according to Swinhoe, flocks of hundreds of this species constantly pass, flying swiftly like the Golden Plover. The natives call them "Sha-chee," or Sand-fowl. They are generally caught in nets; and after a fall of snow a space is cleared, upon which the net is placed and

the place strewed with small green beans. Upon these catching the eyes of the birds, the flocks descend into the snare and are trapped. Great numbers could be taken in this way. Although shy when on the ground, yet on the wing they would dart within a few yards of a person. Their cry was a kind of melodious chuckle. According to native testimony, they are numerous on the great plains of Tartary beyond the Great Wall, where they breed in the sand. In Mongolia, according to Prjevalsky, as given in Rowley's 'Ornithological Miscellany,' this is one of the most characteristic birds, and is found both in the steppes and deserts. In summer they go beyond Lake Baikal in the north to breed, but spend the winter in the Gobi desert and in Ala-shan. They go in enormous flocks, and feed chiefly upon the seeds of *Agriophyllum gobicum*. They fly rapidly, with a peculiar noise of the wings; and at a distance the sound a flock makes is like the sighing of the wind. When flying they utter a note like "*truck-turuck, truck-turuck*;" and small flocks are accustomed to rise in the air and swoop down towards the ground, as Rooks do when migrating. On the ground they run clumsily, and their tracks much resemble those of small mammals. Like the species of *Pterocles*, these birds visit some drinking-place every morning and evening, but never settle without first describing a circle to assure themselves that there is no danger. Prjevalsky also met with this species in the Hoang-ho valley in South-east Mongolia, and also about Kalgan. This species deposits its eggs in the sand; and the female does not sit very closely, but leaves her charge when approached, and also every morning and evening exposes the eggs to the weather, in order to visit the drinking-places. It is a very shy bird, and takes wing generally before one can get near enough to shoot. *Falco hendersoni* persecutes them, but cannot always catch them.

*Male.* Top of head, occiput, back of neck, a line behind the ear-coverts, and breast grey; on the forehead an ochraceous tinge; chin pale buff. Throat, ear-coverts, and a line on each side of the upper part of the hind neck dark orange. Across the breast a band of dull white, each feather margined narrowly with black. Back and wings vinous, the former barred with black. Outer webs of the greater coverts chestnut, forming a conspicuous bar along the wing when closed. Spurious wing-feathers buff, with a central black line. Primaries light ashy grey on outer webs, dark brown on inner; the fifth to ninth conspicuously margined on both webs with light buff. The first primary considerably elongated and attenuated. Abdomen jet-black. Vent and under tail-coverts pure white. Tail grey, like the primaries, scalloped on the edges of the feathers with buff and tipped with white. The median pair elongated, filamentous, their lengthened portion brownish black. Tarsi and toes thickly covered with short buffy-white feathers. Bill yellowish brown; iris dark brown; nails black.

Total length  $14\frac{3}{4}$  inches, wing to end of first primary 10, tail to end of median rectrices  $7\frac{1}{2}$ , bill along gape  $\frac{1}{2}$ .

*Young.* Top of head buff, streaked with black. Throat buffy

white, with a narrow black line bounding its lower edge. Upper part of breast grey; abdomen and a spot on the centre of flanks dark chestnut; chest and upper part of flanks, rest of underparts, and under tail-coverts pure white. Entire upper parts buff; secondaries and lesser wing-coverts barred irregularly with black. Greater wing-coverts chestnut on their outer webs. Spurious wing-feathers buff, with a central black line. Primaries grey on outer webs, dark brown on inner, and margined on the innermost ones with buff. Tail dark grey, tipped with white and barred on the inner webs with buff, the outer webs having only a slight buff edging. First primary and median rectrices filamentous, the lengthened portion brownish black. Tarsi and toes covered with greyish feathers. Bill brown.

Total length  $10\frac{3}{4}$  inches, wing to end of lengthened primary  $8\frac{1}{4}$ , tail to end of median rectrices  $5\frac{3}{4}$ , bill along gape  $\frac{3}{8}$ .

I have not seen this stage of plumage described by any writer. There are two specimens in the Paris Museum—one a little more mature than the other, with the bar across the breast commencing to show as in the adult male.

*Female.* Crown and neck buff, striated with black. Throat ochraceous yellow, feathers edged with black. The upper parts like those of the male, but barred more closely with black; and the wing-coverts are spotted with black. Across the throat is a black band; and the sides of the neck and breast are spotted with black. Rest of plumage like that of the male; but the primaries and median rectrices are not so lengthened. The dimensions are about the same as those of the male.

## 2. SYRRHAPTES TIBETANUS.

*Syrrhaptes tibetanus*, Gould, Proc. Zool. Soc. (1850) p. 92; id. B. Asia, pt. ii. pl. 12; Reich. Syn. Av. Gallin. (1851) pl. ccvii. b. figs. 3020–21; Adams, Proc. Zool. Soc. (1858) p. 502, (1859) p. 186; Hend. & Hume, Lahore to Yark. (1873) p. 279; Przevalsky in Rowl. Orn. Misc. pt. ix. p. 384 (1877).

*Kaling*, Tibet and Ladák (Henderson), *Stepnaya Kuritza*, *Tibetskaya* (Przevalsky).

*Hab.* Salt Lakes of Ladakh (*Adams*); Karakash valley, Yarkand (*Henderson*); Northern Tibet, steppes of Kokonor (*Przevalsky*).

Mr. Henderson (*l. c.*) says that this species was met with by the Yarkand Expedition in the Karakash valley towards the end of July, also at a lake twenty miles south-west of Mallik Shāh, and was very abundant at Chāgra, above the Pángong lake, where it flew up and down the stream in flocks of several hundred individuals, uttering all the time a cry like “Yak, yak.” It was very tame; and a great many were shot and, unfortunately, eaten.

Lieut. Przevalsky (*l. c.*) first met with this Sand-Grouse in the Kokonor steppes in flocks of from ten to thirty, but in Northern Tibet saw it in flocks of about a hundred individuals. They were generally on the sandy plains, and fed on the seeds of various grasses and beans. When so engaged they could be approached quite close, and seldom flew above a hundred yards before settling again,

even when shot at. When flying they utter a note like "*caga, caga*," and on the ground run clumsily and slowly, generally forming a line. In Northern Tibet they were frequently heard flying about at night; but no cause could be found to account for this strange behaviour. The Kokonor basin, according to Prjevalsky, forms the northern and probably also the eastern limit of its geographical distribution.

*Male.* Head and back of neck barred alternately with black and white, chin and front yellowish white. Sides of neck and throat orange-yellow. Breast buffy white, barred irregularly with brownish black. Upper part of back and wings buff, lower part of back and rump buffy white; all the feathers minutely mottled with black, hardly perceptible on the wings. Inner webs of scapulars black. Primaries and secondaries brownish black; the fourth to eighth primary brownish white at the tip, mostly on the inner web. Median rectrices like the back, lengthened and filamentous, their apical half black; lateral feathers reddish buff, barred with black, and tipped with white. Under surface white; under tail-coverts reddish buff, barred with black and tipped with white. Legs and feet covered with buffy-white feathers; bill and nails black.

Total length  $15\frac{1}{2}$  inches, wing 10, tail  $7\frac{1}{2}$ , bill along gape  $\frac{1}{2}$ .

#### 4. Descriptions of nineteen new Species of Diurnal Lepidoptera from Central America. By F. DuCANE GODMAN and OSBERT SALVIN.

[Received Jan. 18, 1878.]

Nearly half of the species described in this paper have been sent us during the past year by Mr. H. Rogers from Costa Rica, where he has been collecting on the slopes of the volcano of Irazu. The rest of the species are selected from unnamed specimens in our collection, some of them from Guatemala and some from Mexico. Figures of most of them have been prepared and will be published shortly. Specimens of all the species are in our collection.

#### SATYRIDÆ.

##### 1. EUPTYCHIA PHILODICE.

♂. Exp. 1·9 in. Margin entire, anal angle of secondaries slightly produced; rich brown, central portion of the primaries slightly paler, middle of the secondaries rich reddish fulvous with a very distinct tawny-yellow patch, the inner edge slightly sinuate, the outer extending to two black submarginal spots between the radial nervules; a third nearly obsolete black spot between the median branches: beneath reddish brown, a dark band crossing both wings through the middle of the cell of each, strongly sinuate on the secondaries; beyond the cell of the primaries are two subparallel transverse bands including towards the inner margin a tawny yellow band; a conspicuous tawny yellow band crosses the secondaries